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ABSTRACT

A report is given of a 3-year longitudinal study which has two strands, both of which are concerned with understanding better the complexities of teaching and learning science, knowing more of the processes by which individuals change, and understanding more of the research methodologies appropriate for these purposes. The first strand involves science teachers in secondary schools working in a collaborative fashion with the researchers. The second strand involves a group of science graduates who undertook a 1-year preservice education course during which an intensive case study of the development of the members of the group was undertaken. A description is given of issues of significance for teacher education which were reflected in the program undertaken by the students. The program reflected three broad areas of constructivist learning: student teachers' views of teaching and learning, their understanding of the content they teach, and their views of self. The most striking findings from the year related to the nature and extent of personal development, growth, and change experienced by many of the participants. This development was evidenced in individual intellectual competence and self-esteem. (JD)

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Learning about learning to teach: A case study of pre-service teacher education[1]

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INTRODUCTION

The research reported in this paper is part of a three year longitudinal study which began in 1987. The study has two strands, both of which are concerned with understanding better the complexities of teaching and learning science, knowing more of the processes by which individuals change, and understanding more of research methodologies appropriate for these purposes. The first strand involves science teachers in secondary schools with whom we are working in a collaborative fashion (White et al., 1989). The second strand involves a group of science graduates who undertook a one year pre-service teacher education course in 1987. During that year an intensive case study of the development of the members of the group was undertaken. In 1988 and 1989 some members of the group are being followed through their first two years of teaching.

It is this second strand which is relevant here, and we return to it in the second half of the paper. Before that we describe some issues of significance for pre-service teacher education. We do this because of the importance of these issues and, more importantly, because the pre-service program undertaken by the students in the second strand of our research attempts to reflect these issues. Thus consideration of the issues will give some detail of the context in which these students worked in their pre-service program, context necessary for an understanding of the case study data and interpretations.

ISSUES OF IMPORTANCE FOR PRE-SERVICE SCIENCE TEACHER EDUCATORS

The year in which this group of students undertook the pre-service (Diploma in Education or Dip.Ed.) program at Monash, 1987, was the tenth year of this somewhat different pre-service course for intending high school science teachers. Below we set out, in the form of propositions, the major principles guiding the present program. In each case, support for the principle is described briefly, and the ways in which the program reflects the principle are noted. Although the principles are listed as discrete propositions, they clearly interact and, taken as a whole, form one coherent framework for pre-service teacher education.

It is important, and also obvious, that the understanding of those responsible for the program (the first author and J.R. Northfield) has changed over this 10 year period. Not all of the propositions listed below were of influence in 1978, nor were those which were of influence necessarily understood in the way now described. Further detail of this and other aspects of the principles and the course can be found elsewhere (Gunstone & Northfield, 1986, 1987; Northfield & Gunstone, 1983), as can a set of related principles argued to be appropriate for in-service education (Gunstone & Northfield, 1988).

Proposition 1: The prospective teacher has needs which must be considered in planning and implementing the program, and which shift through his/her preservice development

This proposition was central to the initiation of the Monash science teacher pre-service program in 1978. Consistent research findings about the needs and concerns of pre-service students pointed to the importance of needs/concerns as students move through a pre-service program (e.g. Fuller, 1969; Gunstone & Mackay, 1975). Initial needs/concerns, it is argued, are often largely about self (e.g. have I

made the right decision about being a teacher?; will I cope in the classroom?), then often move to task (e.g. how do I teach this topic?) and finally to impact (e.g. have students learnt anything about the topic?). There is a strong suggestion that self needs should be considered as a focus for the curriculum of the early part of a pre-service program. As discussed in a later section, data from this study leads to an elaboration of this suggestion.

This change in student needs/concerns implies a program with changing emphases. Our response has been to develop a more integrated program with separate subjects de-emphasized, thus allowing the focus of the program to shift through the year. (Consequent administrative requirements include a variable timetable.) For example, to address personal needs we ignore much of what are usually termed foundation subjects in the period learning to the initial 3 week teaching practice block, a period of about 7 weeks, and integrate all activities under the theme "preparation for teaching". These activities are designed to build confidence and knowledge about themselves (e.g. video replay of their teaching of peers, reviewed by peers in a very supportive atmosphere) and gain confidence and experience in working with pupils (e.g. teaching one pupil; working with very responsive primary (elementary) students). Considerable time is given to reflection, both oral and written, on these experiences. In these reflections self, task and impact concerns are often inextricably connected.

In focussing on student teacher concerns, a position is taken which emphasizes a "Learning to Teach" philosophy rather than a "Teacher Education" philosophy (Feiman Nemser, 1983). This distinction, although subtle, embodies an important value position which is developed further in later propositions.

Proposition 2: The transition from learner to teacher is fundamental and difficult, and is greatly facilitated when intending teachers work closely with their colleagues

Implied in this proposition is the value position that student teachers learn from each other. Traditional courses such as that from which we broke in 1978 often involve lectures/seminars in separate subjects, with different seminar groups and staff for each subject. Under these circumstances it is very difficult for students to genuinely know and work with their peers, and for staff to develop opportunities for student teachers to work together. The initiators of the program believed in the 1970's that if staff and students were able to work together in a more continuous way there was much more chance of creating an environment where students had confidence in, understanding of, trust in, and respect for their colleagues (including staff!). There would also be greater possibilities for organizing group activities and allowing student teachers to take more responsibility for their own learning.

Notions of teaching as an individual activity were (and still are) challenged by moves to school based curriculum development (SBCD) and greater curriculum autonomy for schools. It appeared to us in the 1970's that, if SBCD was not to become individual teacher autonomy, the teacher role had to include far more collaboration with other teachers and members of the wider school community. It therefore seemed an anomaly that preservice did not provide opportunities for working with others.

Further challenges to the view of teaching as an individual activity have come more recently from views of professionalism which emphasize the importance of reflection on practice (Schon, 1983). Various action research projects (e.g. Baird & Mitchell, 1986) make

clear the personal value that teachers see in reflecting on aspects of their practice, in particular interacting with colleagues in the process of reflection. A willingness to share experiences and provide support for colleagues is crucial in teaching. Hence we now see it as essential that preservice programs include opportunities to develop attitudes and skills relevant to this issue.

The response here in the Monash preservice program is, to those teaching in the program, obvious. Student teacher in the program (in 1987 about 60) are allocated to seminar groups of 15-18. These groups are constant throughout the year and across all areas except specialist method work (Biology, Chemistry, Physics etc. for most students, with, in recent years, a small number of non-science students). Each group of students has (usually) 2 members of staff who are responsible for all group activities. Relatively few lectures are provided for the whole group of students as many topics and activities are introduced in the seminar groups. Within broad guidelines, each seminar group is encouraged to develop in its own way. To this end, student teachers are required to discuss and negotiate details of each task, assessment requirements, etc. Considerable use is made of tasks where one product comes from a group of students (e.g. one written piece from 4 students, with no identification of individual contributions).

This collaborative aspect of the program has been particularly successful. Without it, we could not seriously tackle (let alone achieve) many of our program objectives. Each seminar group, including the staff, is intended to provide a setting where all participants gradually gain personal confidence and support from colleagues with whom they work. Social and personal relationships that form are a strength of the program and a source of support which extends into

subsequent teaching careers. Over many years, evaluative comments obtained from participants at the end of the program consistently emphasize the value they see in this seminar group structure.

Our present conceptualization of the transition from learner to teacher is that it is largely transition from directed learner to one who understands and controls his/her own learning. The concentrated involvement with one small group contributes significantly to any such transition. The metacognitive implications of this conceptualization are addressed further in Proposition 3(i) below.

Proposition 3: The student teacher is a learner who is actively constructing views of teaching and learning which are based on personal experiences and strongly shaped by perceptions held before entering the program

The view that learners should be seen as individuals who construct their own meaning from experiences has been significant in recent years in investigations of learning, particularly in science (e.g. Driver et al., 1985; Gunstone, 1988; Osborne & Freyberg, 1985; White, 1988). This proposition reflects such constructivist perspectives on learning, as applied to the teacher preparation program.

Responding to this view of student teacher as constructivist learner has been a continual challenge. At present the program reflects three broad areas of constructivist learning: student teachers' views of teaching and learning; student teachers' understanding of the content they will teach; student teachers' views of self. Table 1 sets out our views of this proposition, as we attempt to apply it to those 3 constructivist areas.

Table 1 about here

Each of these 3 areas is now briefly considered.

(i) Student teacher views of teaching and learning: After at

least 16 years experience as learners, students come to programs with well developed views of teaching and learning. These views are very persistent and often at odds with the views we hope to cultivate. Hence the views need to be identified, discussed and evaluated by student teachers by means of carefully managed teaching/learning experiences. These experiences are of 2 general types.

One type is concerned with revealing and challenging perceptions of one's own learning (e.g. teaching student teachers particular concepts, and then having them write about what they have seen of their own learning, the learning of others, and relations between teaching and learning). Greater detail of some of these experiences is given in Gunstone and Northfield (1986). It is here that the metacognitive emphases alluded to in Proposition 2 are particularly crucial. The perspectives laid out in Table 1 focus on the learner (student teacher) being able to effectively undertake the constructivist processes of recognition, evaluation, and, where needed, reconstruction of his or her conceptions, perceptions, attitudes and abilities. This clearly requires the learner to be more metacognitive. Given that many science graduates emerge from their degrees with broad notions of learning and teaching in formal classroom settings which are the antithesis of what is implied in Table 1, this is a fundamentally important issue. Most graduates in teacher education programs require considerable assistance and support to even begin to take control of their own learning in this constructivist way. This assistance and support is rarely, if ever, provided by separate and decontextualized programs such as those usually described as "study skills". Rather the assistance and support must be in the context of what is seen to be learning of value by the learner; that is, it must be woven through the usual course as an

ongoing influence on the pedagogy adopted by those teaching the course. (This argument is elaborated in Gunstone & Baird, 1988).

The other type of experience focusses on perceptions of teaching and pupil learning. Some have already been mentioned: peer group microteaching, teaching one student, experiences in primary school. Others include: planning and implementing a year 7 field excursion which takes place during a residential camp; planning and implementing a full one week program for all year 7 students in a nearby high school, a process which requires some weeks of negotiation with the school's staff; for the first time in 1987, a group spending a term (10-12 weeks) in a school (Northfield, 1989).

The emphasis in both types of experience, as in all the program, is on reflection on personal experience as ideas are recognized, clarified and reviewed. In this way encouragement is given to consider practice in a way which facilitates continuous professional development (Schon, 1983). Personal experience is seen as forming the basis for considering and changing ideas, with educational theories and concepts providing ways of organizing and interpreting this experience.

(ii) Student teacher views in subject matter areas: In the Monash circumstance, most student teachers in this program possess degrees with majors in science and/or mathematics. For this reason, and because the program initially was solely for science teachers, we consider the example of science to illustrate this proposition. There are 2 ways in which students' views of science concepts need to be considered.

Firstly, this academic preparation is rarely broad enough to prepare students to teach all aspects of a general science program. Hence, since its beginnings, our program has included a series of

minicourses designed to give participants some introduction to and confidence in unfamiliar science content areas and skills. Examples include Physics for Non-Physicists, Microbiology, Solar Energy, Establishing and Maintaining an Aquarium. In some cases, the teaching/learning approaches used explicitly model approaches seen as appropriate in schools. (The use of the term "model" here is deliberate, and elaborated in Proposition 4.)

The second significant area involving science conceptions of student teachers is their area of specialization in their degree. It is relatively common for them to hold naive, alternative, and erroneous conceptions in areas they have studied intensively (see, for example, Ameh & Gunstone, 1986, 1988; Arzi, White & Fensham, 1987). This issue must be handled with considerable sensitivity, as much of the self esteem which student teachers possess on commencing teacher preparation is derived from their successful academic study. The identification of alternative conceptions should occur in the context of personal experience of constructivist views of learning and teaching. That is, experiencing teaching which is more than the laying on students of well organized ideas, experiencing pedagogies which see learning as a personal responsibility, etc. In this way, the conceptual difficulties of the student teachers can be used to contribute substantially to the development of their views of teaching and learning, and their attitudes to science education.

(iii) Student teacher views of themselves: the essentials of this aspect of student teachers' views have already been considered under Proposition 2 - the transition from learner to teacher involves an understanding of self; an understanding of self *per se* is fostered by using teaching tasks to promote understanding of self as a teacher;

reflection on views of self is encouraged by the support engendered by working closely with a small number of peers and staff.

Proposition 4: It is more important to model than to mimic the teaching/learning approaches advocated in the program

By mimicking we mean practices such as having student teachers work through some piece of school science program as if the student teachers were themselves school students. While this is can be helpful, it is limited. Of much greater importance is the need to use teaching and learning strategies being argued in the pre-service course to promote genuine learning among the student teachers. The practical implications of this proposition are obvious: those teaching the pre-service program should behave pedagogically in concert with their principles.

Two examples are given by way of brief illustration, one specific and one more general. The specific example concerns concept maps (Gunstone et al., 1988; Novak & Gowin, 1984). Concept maps are one of a number of learning strategies aimed at increasing learning with understanding among school students which we teach to our pre-service students. The beginning point with concept maps is to use them in ways which can promote understanding among the pre-service students. This is importantly different from beginning with an example of a concept map which is given as something which could be used with, say, grade 7 science students. Of course pre-service students may well find the grade 7 concept map of cognitive demand to them if they undertake the mapping task. The point we are making is that undertaking a concept map is the beginning point, as opposed to giving pre-service students an example of a concept map with the sole intent that they might use the task with students they teach.

At a more general level, consider the program's metacognitive concerns which are described under Proposition 3(i). As well as providing experiences of the form outlined in that previous section, genuine acceptance of these concerns by staff requires them to indulge in a relatively high-risk activity. This is to explicitly challenge students to consider the nature and value of course experiences: what are the purposes of the experience? Are the purposes appropriate? Is the pedagogy used consistent with the purposes? What other learning/teaching approaches might have been used? Would any of these have been more useful to the learners (i.e., student teachers)? and so on.

Our ongoing student evaluations of the program point to the importance to them of consistency between espoused pedagogical principles and actual behaviour by staff. This importance is shown by both positive comment on examples of consistency between espoused principle and actual practice, and negative comment, often detailed and perceptive, about examples of inconsistency.

Proposition 5: Student teachers should see the pre-service program as an educational experience of worth.

The importance of this proposition is best illustrated by considering the extreme alternative - if student teachers see the pre-service program as being an experience of no educational worth, then they are living through a model of teaching which is irrelevant to their learning. The potential consequences of this irrelevance, particularly in terms of affecting student teachers' views of the nature of their role in schools and their responsibilities to school students, are obvious. Here the practical response at Monash includes seeking continuous feedback (which is easy in the small group

structure), giving some student control over program content, and explicitly encouraging students to reflect on both the purposes of those teaching them and the relationships between these purposes and the pedagogy adopted (as noted under Proposition 4).

Proposition 6: Pre-service training is, by definition, inadequate.

That is, a program conducted before students undertake full-time teaching clearly cannot prepare students completely. It is crucial for students to realize this and why it must be, and to realize that the pre-service year is only the first year of a career of professional development. Students who fail to see this will frequently seek things from the program which it cannot give, such as the perfect discipline strategy to use with all students, and consequently fail to see what the program can give. For some students, understanding the intent of this proposition is difficult. Accepting the proposition's validity can be even more problematic. A few students in any group are always likely to see the expression of the proposition as some form of excuse by those teaching in the program for the inadequacies of the program; that is, an excuse for not doing what should be done. It is these students for whom understanding and acceptance of the proposition is both most difficult and most important.

Proposition 7: Schon's conception of the 'reflective practitioner' is a vital model for those who teach pre-service program.

Those who teacher pre-service programs will develop their programs by reflecting on their own practice in the way already argued as essential for students in these programs. This is also, of course, a logical consequence of Proposition 4. It is most valuable for students to be aware of such staff reflection.

A LONGITUDINAL STUDY OF DEVELOPMENT OF PRE-SERVICE STUDENTS

We turn now to the study of a group of students who undertook the Dip.Ed. program described above in 1987. As already mentioned, this study is continuing with some of these students through 1988 and 1989 and is one of two strands of work exploring the processes of teaching and learning science, and of change in individuals. Here we concentrate only on the 1987 Dip.Ed. year. Although this study was not conceived of as an evaluation study, it will be clear from the description of the study below that the data point to issues of program evaluation. Hence some evaluative comments about the program will be made.

The aims of the study

The Dip.Ed. strand of the research had 3 aims:

(1) To know more about what the experience of pre-service teacher education is like for the participants involved.

(2) To know more about the processes by which individuals change with experience during the program, with particular concern with explanation of processes and effects of participants assuming greater awareness of, responsibility for, and control over their practice.

(3) To know more about appropriate methodologies for exploring Aim (1) and facilitating Aim (2).

The methods used in the study

One of the seminar groups described under Proposition 2 above was selected. Initially this group contained 15 students, with 13 of these remaining in the course for the complete year. These students and the two staff (whom we term "teachers" here) who worked with the group were all participants in the study. In addition a researcher spent the year

with the group. The researcher (JB) and the two teachers (RG, MS) are the authors of this paper. One of the teachers (RG) was also one of the researchers who initially planned the study. Attempts were made to monitor any conflict arising from these dual roles. We believe no substantive conflict emerged (although we note in passing that this teacher did acquire some different and important insights into the nature and demands of this style of research as a result of being both "researcher" and "subject").

The researcher was both a participant observer of the group and responsible for a continuing case study exploration of what constituted the most salient essences of all participants' experiences during the Dip.Ed. year. Participants here, we reiterate, included both students and the two teachers. The methods used to foster this reflection on the year included:

- having participants maintain diaries throughout the year (these remained confidential, seen only by the writer and the researcher);
- individual and group-based interviews, sometimes general but more often focussed by particular tasks (with the first of the interviews being conducted individually before the course commenced);
- periodic written evaluations, again sometimes general and sometimes focussed;
- at the end of the year, preparation of a substantial and summative written report and a lengthy, individual interview focussing on their perceptions of the whole year. For the written report participants were provided with any of the preceding interviews, evaluations etc. which they requested.

The nature of the research is such that the data obtained are subjective, as they are a product of what is observed, by whom, when, and where. Given the purposes of the research, this subjectivity does not, of itself, compromise the significance of the findings. However, estimation of the level of significance requires that the findings must be appraised for their accuracy, validity, and reliability. This appraisal is particularly necessary in relation to one important aspect of the study, that related to the personal development experienced by all of the participants. For example, whether they be self-perceptions (e.g. 'this course helped me to develop and understand myself better - I'll never be the same again.') or perceptions of others (e.g. '[Student 3] has really blossomed this year - she started off shy and uncertain, and she has become more confident and assertive. She will be a good teacher.'), the bases for such perceptions need to be ascertained and checked carefully.

The accuracy, validity and reliability of data were checked primarily through a principle of triangulation, where findings from three different perspectives (the teachers, students, and researcher) were contrasted and interpreted. Triangulation occurred progressively through the year, based on the various methods of self-report and participant observation, and at the conclusion of the program, through comparison of written evaluations, oral reviews, and a post-hoc task given to the teachers and six of the students early in 1988. All data reported below are supported by this triangulation, unless specifically noted otherwise.

Attribution of causality for findings is even more problematic. Current understandings of the nature and processes of classroom teaching and learning do not permit assertions involving simple and

direct cause and effect relationships. Indeed, such relationships may not exist. However, certain correlations between the nature of the course and the intellectual development experienced by the participants became increasingly apparent through the year.

The formation of the group which participated in the study

The seminar groups which are involved in this particular program are always formed in the same way. Entry to all pre-service programs at Monash is by written application. Only students with potential language difficulties are interviewed. Details given by students on enrollment forms are then the only data available before the course begins. These data are used to form the seminar groups, prior to commencement of the course, so that the groups contain even distributions across the characteristics which are available: gender; age (which gives a crude measure of experience outside formal education); intended teaching subjects (Physics, Chemistry, Biology, General Science, Mathematics, non-maths/science); institution from which degree has been taken (in terms of Monash or not Monash).

In 1987 this same procedure was used to form the four seminar groups in the program, and one of these student groups then randomly selected to be the focus of the study.

Introducing the research to the student teachers

The pre-course individual student interviews were conducted without revealing the nature of the research. Students were told that the intent of the interview was to get to know something about them before the course commenced (a true if incomplete statement). This was done because of the very strong role of the group structure in the program, and the researchers' belief that students should know something of the nature of this role, before considering whether they

wished to be involved in the research. Of course it was not possible to wait too long before seeking their agreement. Consequently a scheduled seminar session on Wednesday of week 2 of the program was used to introduce the research to the students and invite their participation. By this time the seminar group had met for about 11 hours (including a micro teaching experience) and the students had also had contact with other seminar group members in specific methods sessions, sessions involving all students in the program, and two daytime social gatherings.

The nature and purpose of the research was discussed openly and at length with the group in this session. Questions were answered frankly. All agreed to be involved, some with considerable enthusiasm and, as far as was observable, none with clear reluctance. Obviously we are uncertain of any perceptions of group pressure to be involved, although no evidence of such pressure emerged in any subsequent individual interaction with the researcher. Considerable emphasis was placed on the confidentiality of any individual interactions between students and researcher, and teachers and researcher. It was made clear that no one apart from student (or teacher) and researcher would have access to any of these interactions unless the student (or teacher) agreed or unless anonymity could be guaranteed. It was also made clear that the researcher would play no part in any assessment of students. After the agreement to be involved had been established the diaries were discussed. All agreed to maintain a diary and all took away a notebook to serve this purpose. The subsequent use of diaries was variable across students and, for most students, somewhat variable by time of year.

Data from the study

It is clear from the description of methods that a large quantity of data was generated. A report of the study has been produced (Baird et al., 1989) which, despite giving detailed data for only four of the students, runs to over 100 typed pages. Hence, in this paper, we report only selectively from these data. We consider only the students, only the data collected in 1987, and only the 13 who completed the course. One of the other two who began the year left in the first week (we believe to accept employment), and the other decided during the first period of teaching practice that he/she did not want to pursue a teaching career.

We now consider some of the data from the initial, pre-course interviews, some very brief summaries of the case studies (progressive triangulation) through the year, an important methodological issue revealed by the triangulation, and some of the final reports produced by the students.

The initial interviews: These extensive and individual interviews explored students' perceptions, conceptions and attitudes regarding teachers and teaching, learners and learning, and personal teaching and learning abilities. (Some aspects of intellectual performance - critical observation, hypothetico-deductive thinking, conceptions of energy - were also explored at this interview and in another interview after the course had commenced. Data are reported in Baird et al., 1987).

There was a noticeable and consistent feature of the students' perceptions of a "good teacher" when they entered the Dip.Ed. course: they placed significant emphasis on affective (humanistic) attributes. For example, in response to the separate questions "Who was the best

teacher you ever had? Why?" and "What do you think are the three most important attributes of a good teacher?", affective attributes were given as frequently as cognitive or professional competence attributes. Table 2 summarizes data from these two questions.

Table 2 about here

Responses to three other tasks given in the interviews also consistently revealed this perception of the importance of affective attributes in a good teacher. A list of "ten different characteristics which a person may have" were given, and students asked to indicate which of the characteristics they believed to be associated with "a very close friend" and with "an excellent teacher". The list of characteristics is given in Table 3, together with resulting data.

Table 3 about here

The list arose from responses given by secondary school students in a previous study. These secondary students had strongly associated good teaching with affective attributes. Hence the list shown in Table 3 is, deliberately, very much concerned with affective attributes. What is interesting is the discrimination between "close friend" and "excellent teacher", particularly the quite low ratings of "likes you" and "thinks the same way you do" for teaching. This implies some maturity about the perceptions of importance of affective characteristics for teachers. Another activity given in the interview involved a list of seven task-related aspects of teaching. Students were asked to rate each aspect in terms of "how important you think it

is to know how to do it well" (Resulting data is shown in Table 4) and "your present level of competence at it" (data not reported here). The

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Table 4 about here

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two aspects ranked most highly relate to interpersonal, student-centred issues, thus again reinforcing the perceived importance of affect. Finally, students were asked "how do you think the profession of teaching compares with being a politician, businessman or scientist?" Once again humanistic, affective issues were paramount as students commented on the challenges and responsibilities of the profession, the rewards of teaching, and the effects they (as teachers) expected they would have on other people.

The balance students saw between the cognitive and affective components of teaching was also evident in their perceptions of learning. Even more so than for a good teacher, students perceived a good learner as a person who has desirable affective attributes. These attributes were described mainly in terms of motivation, interest, enjoyment, conscientiousness, and perseverance. All of these attributes influence the preparedness of the individual to make the required <u>effort</u> to learn well. Cognitive attributes such as objectivity, open-mindedness, an analytic approach, and organisational ability were volunteered, but less frequently. Perhaps surprisingly, innate intelligence was only mentioned twice explicitly.

It appears then that students' perceptions and conceptions of teachers and teaching, and learners and learning, are an amalgam of cognitive and affective features. According to a constructivist perspective, effective instruction should acknowledge both features,

and build on and develop them in a coordinated fashion. Other data indicated that students were only too aware that their prior teaching/learning experiences (especially at university) were unbalanced, in that cognitive features of instruction far outweighed the little if any attention given to the affective features they considered so important. For some there were clear distinctions between what learning actually is in formal contexts and what it ought be.

In the summative reports and interviews at the end of the year, students perceived the positive outcomes of their Dip.Ed. year largely in terms of the attention given in the course to both cognitive and affective features. This suggests that the course fulfilled needs that the students saw as necessary for their own development.

Case studies through the year: As already suggested, detailed case studies were prepared from all data available for four of the students, identified here as Students 1, 2, 3, 4. In these, aspects of personal change and the influence of this particular Dip.Ed. course on that change are evident. We briefly describe four such aspects.

(i) First, the four case studies indicate that change and development occurred in each of the individuals, sometimes change the individual was not completely aware of it and informed about. What is in some ways the converse of this was seen for one of the other nine students: personal claims of change which were in some instances not supported by other data sources. Needless to say we do not accept the personal claims as valid in these instances.

(ii) Second, the extracts reveal the singular nature of the benefits which were derived from participating in this particular Dip.Ed. program. The nature and extent of each person's intellectual

development were strongly influenced by various components of intellectual competence. For example, Student 1 seemed to be 'made for teaching' from the start. While this person started the course with inadequate conceptions of effective teaching and learning and, to some extent, subject content, his/her thoughtful and perceptive approach readily generated the intellectual development necessary. Participating in the group seminar sessions and, especially, maintaining a diary, seem to have been important for facilitating Student 1's considerable change. Some representative examples are now given. At the end of the first week of the program Student 1 was involved, together with half the rest of the seminar group, in a microteaching exercise. The exercise involved preparing a 5 minute introduction to a topic which could be used with a class of 12 year olds, teaching this introduction to the half-group of peers while being videotaped, and then having the video reviewed by the peers within a deliberately supportive framework provided by the teachers. Students 1's "performance" was disappointing to both teachers because of a strong concentration on covering considerable content. This disappointment was magnified later in the session when Student 1 criticized another student for not delivering enough information in the alloted 5 minutes (and this for a "performance" that the two teachers saw as particularly strong in its concern for student learning). However a week later Student 1 wrote the following in his/her diary entry about the microteaching experience.

> Hit home later that I had presented an information presentation session rather than a learning exercise. I dictated the pace rather than let the class dictate the pace. Conscious of presenting a certain amount of information rather than getting a certain amount of information learnt.

Very soon after the microteaching Student 1 was questioning, reflecting

on and judging what he/she had done. This continued later in ways the course sought to foster. Only a few weeks later came the following diary extract.

> It occurred to me today how our "teachers" in this course work in a climate of continual assessment and evaluation by us the students - [a teachers'] comment "Teaching is a high risk activity" applies to few places more than it does the education faculties/departments of the various teaching institutions. We are learning to be analytical of our own teaching methods, objectives, etc., and while we are not on [teaching practice] we have every day various models up in front of us on whom we practice our analytical skills.

This early recognition and valuing of one of the explicit purposes of the program was taken further by the student. In the second half of the year all students in the group were invited by the researcher to consider writing a critique of the two teachers. In passing it is revealing that Student 1 not only wrote a critique, in doing so he/she provided one of the teachers with a major insight into a weakness in that individual's teaching. More important here is a diary entry made at the time of the critique task.

> Our writing a critique on Dick's and Monica's teaching is - in a way - an assessment of the strategies they have been helping us learn about all year. They practice what they preach - any assessment by me is an evaluation of what they practice <u>and</u> what they preach ... it's not unlike the old confessional box - I'm not sure who's the priest, us, or them. From my point of view I feel like the priest and that Monica and Dick are the confessors. In their position you really are baring your souls. The more conviction with which they tell us something about teaching the more they'd bloody well better practice it 'cause we're sure as hell going to drag them down [outside the seminar room] if they don't ...

A few weeks before this another diary entry argued a lengthy and strong case for the learning value of the diary itself: in essence an argument that his/her diary entries represented personal learnings, by comparison with class notes which were seen as other peoples' learnings. Throughout the program this student's actions, both at university and in schools, were consistent with the substantial

reflective insights illustrated above. The person became (and still is) an outstanding classroom teacher. Student 2 and Student 3 both entered the course with considerable scope for professional development. More importantly, each person's potential for development was limited by negative self-perceptions and reservations about personal worth. Some self perceptions from Student 2, with the time of the year at which the comments were said or written in brackets: "... a bit of a pushover as far as a person goes ... gutless I suppose ... I can't say that there's anything I'm particularly brilliant at ..." (pre-course); "... in fact - pretty ordinary that's me ... I'm really starting to like myself more lately" (after about 5 weeks of the course); "I have - or have had a low opinion of myself. I couldn't believe how low it had been until the Easter camp" (about 8 weeks). For Student 3: "[I] need to be more attentive and openminded" (pre-course); "I just asked myself about my own thoughts about thinking. I hate thinking ..." (about 2 weeks); "... stupid ... underachiever ..." (about 5 weeks); "narrow-minded" (about 12 weeks). Some changes with time are evident in these Student 2 quotes, but not in the Student 3 quotes. The two people differed in the extent to which they took advantage of the opportunities for enhancing self-awareness and self-realisation provided by the course. With the support provided by other seminar group members, Student 2 seized these opportunities and developed significantly. "We aren't into the year yet - I mean its only March 9th, and I can already see how important the group is - particularly for me ... I see the role of the group as one of support" (about 3 weeks); "Strange, if I had said I'm dropping out of the Dip.Ed. course ... I would have had some response from the people in the [seminar] group. Genuine care ... I don't get that [with a non-

university group of friends]" (about 4 weeks); "... I feel more at ease with myself, I know that I'm not supposed to know everything now. I've become happier - the way the course is run - the [seminars] - is very personal, its almost intimate and I like that ... I've grown - I've grown up" (near course end). However, Student 3 was not prepared to give such commitment. This person's attitudes and level of application were erratic; he/she seemed ill-at-ease with the intellectual demands and personal responsibilities of teaching. Writing in the diary seemed to be this person's main avenue for introspection and self-analysis; there was little evidence of such introspection occurring during group-based course activities. Sometimes the diary entries suggested that the student was beginning to come to grips with issues central to learning to teach: "I'm finding the Dip.Ed. course very personal. I am starting to question my own self. This is sometimes very disturbing because I ask myself a lot of questions that I always took the answers for granted" (about 5 weeks); "I really enjoy the [seminars] - they open your eyes about a number of things and make you more confident, in communicating better and organizing yourself" (second half of the year). However these were isolated and, in the absence of reflection during the program activities, were never consolidated. While the personal and professional growth of Student 2 could be characterized as continual and ongoing that of Student 3 was rather saw-like (small gains and then reversion to the former position). Student 3 did not successfully complete the course. Student 4 adopted a manner which contrasted with his/her basic personality. The observers' early comments of 'class ocker'[1] and 'less mature' related to the person's behaviours, rather than underlying intellectual competence. Perhaps more than was

realised initially, this person entered the course with mature, perceptive understandings about aspects of teaching and learning. He/she left the course fully ready to teach. It seems probable that, for Student 4, the course mainly provided certain valuable experiences, such as teaching practice and other substantial school involvement which was part of the program, which enabled him/her to fulfil an already well-established potential.

(iii) The third aspect of the four case studies is that certain general, consistent themes regarding personal development emerged. These themes included the importance for intellectual development of allowing individuals opportunities to examine and reflect on personal intellectual competence and performance. The nature and manner of organisation of this Dip.Ed. program provided many opportunities for such reflection. Further, participation in tasks associated with this research project provided additional opportunities. Both the course and the project emphasised the establishment of supportive interpersonal relationships, in order that students "come to see their major source of learning through the course and through their personal development as being their peers" (one teacher, oral comment in interview, term 2). Most students considered the stable seminar group structure to be crucial in allowing them to develop the trust and confidence to attempt to undergo change.

(iv) The fourth aspect is largely the converse of the third. Students valued least those aspects of their course which did not permit them to generate personal relevance or involvement for what was to be learned. It is important to note that students saw relevance in the broadest sense, not purely in terms of "what do I do on Monday?" They were never reluctant to reflect and attempt to construct relevance. Those

things least valued were those for which students, even after discussion with each other and their teachers, could not create valid links to broad issues of teaching, learning, curriculum and the social context of education'.

A methodological comment: Data collected from all students through the year about needs and concerns is interesting, both in its own right and as an illustration of an important methodological issue. As described in the first part of the paper, a perspective of student needs/concerns moving from "Self" to "Task" to "Impact" is one underlying principle of the course undertaken by the students. Questionnaires concerned with Stages of Concern for both teaching and the Dip.Ed. course were given early in the year, and the second repeated at the end of the year.

Analysis of the data generated by these questionnaires indicated that they contributed little to illuminating the nature and extent of each person's development. What did emerge, however, was evidence that is inconsistent with the notion that individuals progressively and sequentially address and surmount the different levels of concern, a notion which has been argued elsewhere to be appropriate (e.g. George, 1977; Strawitz & Malone 1986). When findings from the questionnaires were taken in conjunction with interview data, and responses to other tasks, students revealed significant Impact concerns from the beginning of the year. Resolution of these Impact concerns was found to be central to their development.

These data suggest that successful personal development requires that concerns at each of the Self, Task, and Impact levels need to be addressed in an integrated manner from the start of training. If this is the case, consideration of Impact concerns should not be delayed until after Task concerns are attended to. One reason for integrated

attention is that the different levels of concern are related functionally. For example, task concerns regarding effective class management and student control may only be surmounted once it is realised that some causes for student inattention or misbehaviour are related to such Impact issues as the appropriateness (relevance, interest, and level of cognitive demand) of the content and its manner of presentation to the students concerned.

This conclusion may appear to be in conflict with the assertion, in the discussion of Proposition 1 above, that self needs are an appropriate focus for the early sections of a pre-service curriculum. However, while the early curriculum of the Monash pre-service program is focussed by considerations of self concerns, this focus is rooted in teaching/learning contexts. Hence task and impact concerns are also considered in a manner integrated with self concerns.

As well as pointing to over-simplification in common perspectives on student needs/concerns, these data also raise a more general methodological issue. The complexity of individual change means that data obtained from questionnaires should be treated with caution. Taken overall, findings from the various types of measure employed in this project indicate that detailed self-report and interview data are essential for understanding the nature of individual change. Other findings not included here also indicated that questionnaire data taken alone yielded quite inadequate and often misleading information.

The final reports and interviews: These written and verbal summative statements from the students are illustrated in terms of specific aspects of the course: seminar groups, teaching practice and so on.

(a) Seminar groups: With only one exception, students valued group work as the most, or among the most, important and worthwhile aspects

of the course. In fact, most students perceived group work activities and the interpersonal relationships which developed as the fundamental influence on their development. This result is completely in accord with course objectives. From quite early in the year, the project group developed an ethos and cohesiveness which facilitated individual change, for example:

> "I saw how important the group was from the very first meeting, how important we were to each other. I realized how important learning from peers is! The discussions we had, the feedback, the encouragement, was very important, not to mention acceptance!" (Student 2)

> "I would have liked the opportunity of observing other members of our seminar groups as they taught in the classroom. I think this could have been of value because we knew each other well and were willing to learn from each other more so than with strangers.... I believe everyone in [our] group learnt at least one thing from every other member." (Student 6)

This individual change comprised two main components: change in general personal attributes (such as beliefs about the nature of effective teaching and learning, and the level of self-confidence and assuredness); development of specific task-related skills and competencies. Many students valued change in the first of these components more highly, considering it fundamental to their professional preparation:

> "I thoroughly enjoyed being in the [seminar group] sessions, because they were dealing with things that are so absolutely important to anyone anywhere. They were people questions, it doesn't matter whether you are teaching, or what. I wouldn't have missed a [group] session for the world. They provided for growth, they provided a thorough avenue for reflection." (Student 5)

> "I think that Dip.Ed. has made me more self-assessive, it has encouraged reflection, assess what is happening, don't just let it happen, and that has made me really good ... When I go into teaching now, I <u>know</u> what is good and bad teaching, as far as I am concerned." (Student 11)

However, a few students were qualified in their appreciation of group work. Intensive personal reflection and interpersonal

interaction are demanding activities. These students sometimes became somewhat disaffected by these demands:

> "I have increased my confidence - fortunately, I was in a group that was so close ... it boosted my confidence, and that spilled over into my teaching rounds. [However], a lot of time is spent debating an issue which ... gets taken to extremes ... after a while I switch off, because the argument goes on for too long." (Student 12)

> "I found it a bit of a chore having two tutors in there. I've never found studying a chore, but I found this a chore, because there is this confrontation aspect often - I will get emotive, and it will draw out this equally emotive response from other parties - the confrontatory nature of it has drained me." (Student 13)

(b) Teaching practice: Teaching practice rounds were also valued by students almost universally. Students needed the "hands on" experience of practice teaching to surmount various concerns. These concerns included the need for reassurance regarding their choice of profession, clarification of specific areas for personal improvement, and generation of personal meaning for a variety of issues raised in the course.

(c) Lectures: These were commonly criticized when there was disparity seen between what lecturers practiced and what they preached, and when students perceived material to be irrelevant to their own experiences.

(d) Method studies: Reactions to specific method studies (Physics, Chemistry, Biology, General Science) were mixed. As would be expected, they were influenced largely by differences in the personalities and teaching expertise of the teachers involved.

CONCLUSION

If one takes a course evaluation perspective on the data outlined above it is possible to assess the appropriateness of the propositions outlined in the first half of the paper.

Such an approach leads to a questioning of any developmental sequence of student needs and concerns but support for the use of needs

and concerns as a tool for construction of curriculum, a use which is central to the first proposition.

The importance of the second proposition (transition from learner to teacher is facilitated by working closely with colleagues) is strongly supported. So also is the need for concern with developing both personal attributes and task-related skills and competencies which runs through all the propositions. The third of the propositions (concerned with the importance of considering the constructivist nature of the learning of student teachers) is also shown to be important by both the data from initial interview and the participants' perceptions of influences on change in the students.

The most striking findings from the year relate to the nature and extent of personal development experienced by many of the participants. This development was in individual intellectual competence (attitudes, perceptions, conceptions, and abilities), and was, as already described, of two major types: in specific, task-related competencies, and in more general aspects of intellectual competence.

The first type of development is largely cognitive, and is linked strongly to the specifics of teaching content and context; the second type is of a more general, fundamental nature, and comprises a significant affective component. The desired product of a course of teaching training should show the benefits of both types of development. Yet training for the second type of development is not made explicit in some teacher training courses. Through its design and manner of implementation, this course provided continuing experiences which stimulated personal development. For the seminar group involved in the research, the project tasks extended this development significantly by requiring additional introspection and reflection

about self, the course, practice, and the future. As presented in their evaluations of overall personal change, many students emphasised this more general development, and considered it the most valuable outcome of the year.

We are of the belief that integrated training for both types of development is required in pre-service teacher education. The findings from this study provide two indications of how this integrated training might be achieved.

The first indication is of the fundamental importance of a constructivist perspective for training in both types of intellectual development. Thus, training must take account of, and build on, the individual's content, or task-based attributes and competencies, and the more general elements of intellectual competence and performance (e.g. those related to personal awareness, sense-of-self, or professional purpose). The second indication is that both types of development are facilitated through personal reflection based on thoughtful, considered introspection. The purpose of this reflection is to enhance metacognition and, thereby, to improve understanding of personal practice. Reflection is as important for the teachers as it is for the students.

Footnote

1. ocker Australian who speaks with a broad accent and is thought by the user of the term to have uncultivated tastes; in the case of males, thought to be 'macho', sexist. (Walker, 1988, p. 175).

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Table 1: Implications of a constructivist perspective for pre-service teacher education

Aspects of the program	To foster student teacher development there is a need to ...
A. The initial perspective	assess student teachers' present strengths, and existing values and perceptions of teaching and learning
B. Planning the program	utilize and build on existing student teacher strengths, beliefs, perceptions - extending their present skills rather than undermining them; this begins by helping them perceive their own existing strengths, beliefs, perceptions
C. Considering student teachers' learning	assess which aspects of the content and format of any new idea will be likely to appeal to student teachers and find ways of encouraging reflection on practice; present ideas so that they are intelligible, plausible and fruitful (part of which involves presenting ideas in ways consistent with the ideas themselves)
D. Considering impact on student teachers	be sensitive to the 5 possible outcomes of the introduction of ideas about teaching and learning - the ideas can be: (i) simply rejected (ii) misinterpreted to fit in with, or even support, existing ideas (iii) accepted, but the student teacher cannot apply them in another context (iv) accepted, but lead to confusion (v) accepted, and form part of a coherent long-term personal view of teaching and learning
A summary of a constructivist approach	seek out feedback and provide experiences and follow up activities to allow student teachers to discuss, evaluate, rethink and (perhaps) restructure their ideas

Table 2: Students' perceptions of a good teacher

Attribute	Number of times attribute was volunteered (n=13)
(a) Affective (Humanistic) attributes	
*Good rapport/'getting on' with students/ approachable/concerned about students and their understanding	9
*Enthusiastic/personally interested in the work	9
*Inspires students	9
(b) Cognitive (professional competence) attributes	
*Organises and presents work effectively (makes work understandable)	10
*Knows the work	7
*Keeps control (gains attention and respect)	6
*Gives students the ability to learn for themselves	2

Table 3: Characteristics from a given list seen to be associated with a very close friend and with an excellent teacher

	Characteristic	A very close friend (n = 13)	An excellent teacher (n = 13)
1	Is enthusiastic and interesting	8	13
2	Likes you	13	4
3	Never puts you down	5	10
4	Helps you when you are in trouble	13	12
5	Is fair and honest	11	12
6	Understands you	12	11
7	Is positive - not harsh or grumpy	7	10
8	Thinks the same way you do	6	2
9	You can talk to and who listens to what you say	13	13
10	Thinks about you and your needs	11	13

Table 4: Students' perceptions of the importance of seven teaching tasks*

	Task	Students' response (n=13)		
		Desirable but not important	Important	Crucial
1	Selecting material to be learned	-	7	6
2	Adapting material chosen to the level of the students	-	5	8
3	Constructing experience for the students to interact with the content	-	5	8
4	Controlling the class	-	7	6
5	Instructing students on the demands and procedures of learning	-	9	4
6	Monitoring students' progress	-	8	5
7	Serving the students as a source of knowledge and skill	-	8	5

(* 6 of the 7 tasks are taken from Fenstermacher, 1986, pp. 39-40)